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A Fixed Device for Lifting and Moving Loads

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Devices for lifting and moving loads are known, and they are, for example, traveling bridge cranes, which have numerous disadvantages, more specifically:

- high cost
- large size and difficult installation.

The present invention is aimed at eliminating these disadvantages, and it deals with a fixed device for lifting and moving loads, characterized by having fixed means combined with each other in such a manner that they can either raise or move a load horizontally, or even perform both operations simultaneously, the device allowing heavy loads to be handled without requiring costly installation.

In one embodiment, two winches are combined with deflecting pulleys positioned for one or for a plurality of cables, the ends of each of the cables being fixed to the two different winches, and each of the cables carrying a load, the load being handled in the vertical direction by causing the winches to rotate in the same direction at any speed ratio, and the load being caused to move horizontally by causing the winches to rotate in opposite directions, and, depending on the direction to be given to the load, the first one or the second one of the winches acting as a driving unit, with the horizontal movement of the load occurring with the winches speed ratio that equals unity, the load movement with a certain inclination requiring a predetermined speed ratio different from the previously mentioned ratio.

In another embodiment, one or several lifting winches, on which the ends of cables are wound in the same direction, are combined with one or several translational winches on which the other ends of the cables are wound in the opposite direction, with the functioning of the lifting winches only, the cable runs being taken up or paid off to cause the vertical movement of the load suspended from a lifting means such as a hook, and, with the functioning of the translational hoists only, to pay off one of the runs and take up the other without any change in the cable length resulting in the translational movement of the load, with the combination of the two operations causing the load to perform both movements

simultaneously.

In this embodiment, the means for attaching the load such as a hook is pivotally attached to the cables by means of pulleys supported by each of the loops formed when the cable changes the direction to the opposite.

The invention also deals with a combination of a motor that controls the lifting of a load by driving two drums by means of differentials and a second motor that controls the translational movement of the load, the motor acting upon the differentials be means of a set of gears in such a manner that the two drums rotate in opposite directions, producing the translational movement of the load, and, if both motors are activated simultaneously, a combination of these two movement occurs.

Finally, the invention covers various possible combinations of the above-described features.

Devices according to the invention for lifting loads and moving them horizontally are shown as non-limiting examples in the accompanying drawings, in which:

Figure 1 shows the first embodiment of the invention.

Figure 2 shows a second embodiment of the invention.

Figure 3 shows a combination of a lifting motor and a translational motor.

A lifting device shown in Figure 1 has two winches 1^1, 1^2, installed close to each other for space saving reasons and combined with deflecting pulleys 2, 3, 4, 5 fixed, e.g., to metal trusses of the building or to any other appropriate support (not shown).

The pulleys receive a cable 6 having each end thereof 6^1, 6^2 wound on each of the winches 1^1, 1^2, respectively.

A lifting hook 7 is pivotally mounted on the cable 6.

To move the hook in the vertical direction, the winches are caused to rotate in the same direction at any speed ratio, preferably, equal to unity for the sake of simplicity.

Each of the winches drive each end of the cable, taking up the cable and causing the hook 7 with the attached load to move up.

To move the hook 7 in the horizontal direction, the winches 1^1, 1^2 are caused to rotate in opposite directions, with the first one or second one of the winches functioning as the driving winch, which takes up the cable end with a certain linear velocity, whereas the second winch pays off the other end of the cable with the same linear velocity.

The problem of the linear velocity of the cables can be facilitated by making the winches with the

same diameter and for the same RPM.

In any case, one of the runs 6^1 connected to the hook 7 is taken up, and the other run 6^2 is paid off, with the working length of the cable 6 remaining unchanged, whereby the pivoted hook moves uniformly in the vertical direction with respect to the ground 100 and is caused to move horizontally.

The vertical movement and the horizontal movement can also be combined by causing the winches to rotate in opposite directions at different speeds so that the working length of the cable becomes larger or smaller.

A lifting device shown in Figure 2 is made by using at least one winch 10^1 designed for lifting a load, on which are wound, in the same direction, ends 8^1, 9^1 of two different cables 8, 9.

The lifting winch 10^1 is combined with a second winch 10^2 designed to cause the translational movement of the load.

This winch with opposite winding directions receives the other ends 8^2, 9^2 of the cables 8, 9.

When the lifting winch 10^1 functions alone, operation occurs with the take-up or payoff of the runs 8^1, 9^1 of the cables 8, 9 to cause the vertical movement of the load suspended from the hook 7.

On the other hand, when the translational winch 10^2 functions alone, by paying off one of the runs and taking up the other of the runs 8^2, 9^2 without changing the working length of the cable, the load is caused to perform the translational movement.

If these two operations are combined, the load performs the two movements simultaneously.

A device shown in Figure 3 has a motor 13 for lifting a load, which drives two drums 15, 16 by means of two differentials 17, 18, the purpose of which will be explained below, the cables 25, 26, being wound in the same direction on the drums 15, 16, thus producing the vertical movement of the load.

The set of this motor and the winches is combined with a second motor 19, which is designed to move the load horizontally and which, being coupled to the differential gears 20, 21 of the differentials 18, 17 by means of a set of gears 22, 23, 24, produces rotation of the drums 15, 16 in the opposite directions, which rotation, as described above, causes the horizontal movement of the load.

The two operations may be combined in order to perform the translational movement and the simultaneous vertical movement of the load.

The devices according to invention have numerous technical advantages, more specifically:

- they are easy to make because they are composed of simple components
- they are, hence, less expensive

- they are small in size

— they can be very easily installed.

SUMMARY.

The invention is characterized by the following characteristics taken in any possible combinations:

1. A fixed device for lifting and moving loads, characterized by having fixed means combined with each other in such a manner as to either raise or move a load horizontally, or perform these two operations simultaneously, the device allowing, without having to perform costly installation such as in the case of traveling bridge cranes, for raising and moving heavy loads.

2. Embodiment 1, characterized by two winches that are combined with deflecting pulleys positioned for one or for a plurality of cables, the ends of each of the cables being fixed to the two different winches, and each of the cables carrying a load, the load being handled in the vertical direction by causing the winches to rotate in the same direction at any speed ratio, and the load being caused to move horizontally by causing the winches to rotate in opposite directions, and, depending on the direction to be given to the load, the first one or the second one of the winches acting as a driving unit, with the horizontal movement of the load occurring with the winches speed ratio that equals unity, the load movement with a certain inclination requiring a predetermined speed ratio different from the previously mentioned ratio.

3. The winches of 2 are made with the same diameter, which facilitates the fabrication and use of the above-described lifting devices.

4. A lifting means such as a hook is pivotally mounted on the cable runs to allow this means to be always positioned favorably for lifting.

5. A second embodiment of 1, characterized by the fact that one or several lifting winches, on which the ends of cables are wound in the same direction, are combined with one or several translational winches on which the other ends of the cables are wound in the opposite direction, with the functioning of the lifting winches only, the cable runs being taken up or paid off to cause the vertical movement of the load suspended from a lifting means such as a hook, and, with the functioning of the translational winches only, to pay off one of the runs and take up the other without any change in the cable length resulting in the translational movement of the load, with the combination of the two operations causing the load to perform both movement simultaneously.

6. An embodiment of 4, characterized by the fact that a means for attaching the load such as a hook is pivotally attached to the cables by means of pulleys supported by each of the loops formed when the cable changes the direction to the opposite.

7. A combination of a motor that controls the lifting of a load by driving two drums by means of differentials and a second motor that controls the translational movement of the load, the motor acting upon the differential gears of the differentials be means of a set of gears in such a manner that the two drums rotate in opposite directions, producing the translational movement of the load, and, if both motors are activated simultaneously, a combination of these two movements occurs.